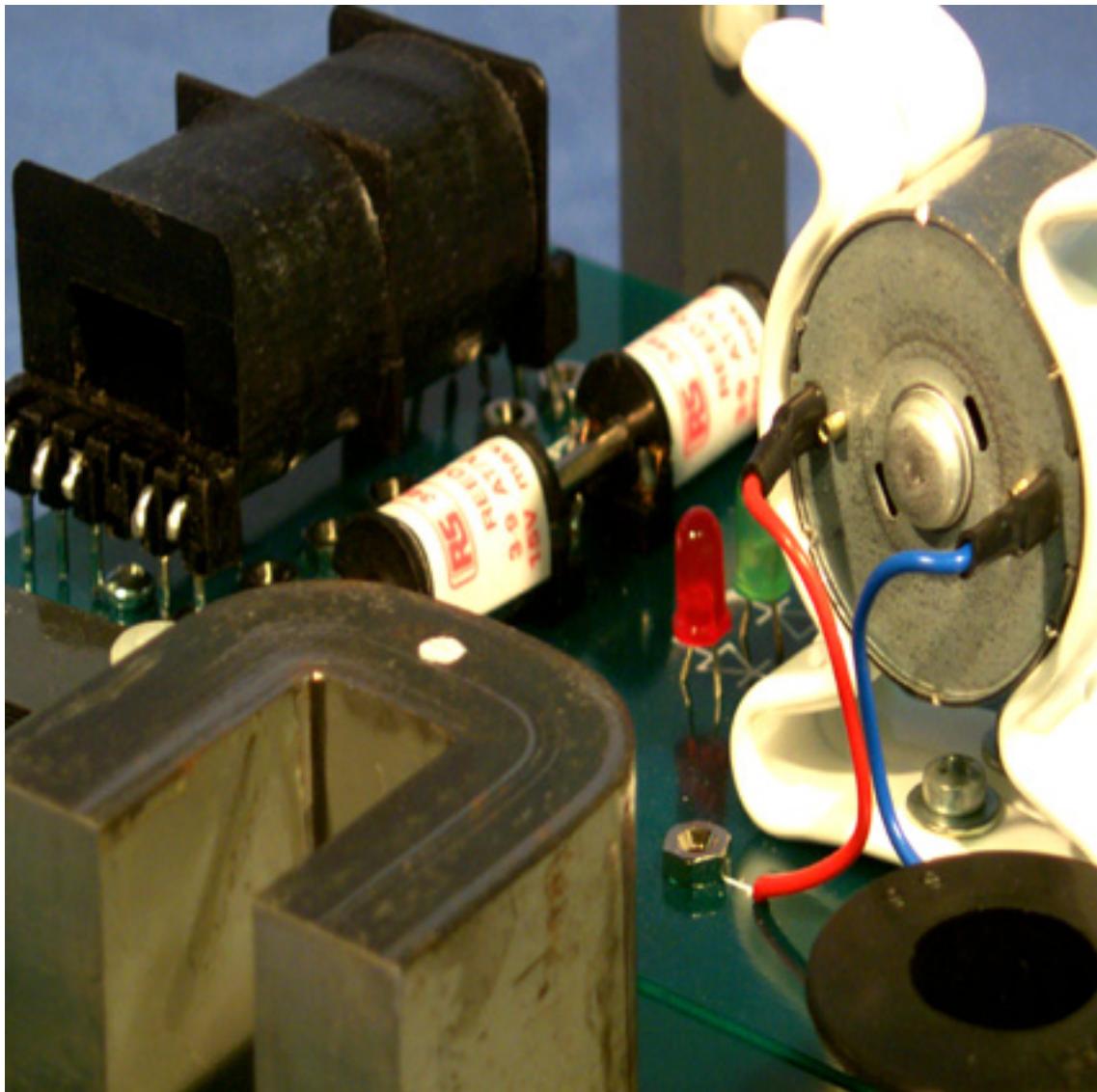
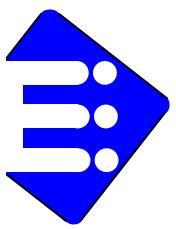


Electron

Educational Equipment
Design, Production & Trading



ELECTRICITY



A11

FUNDAMENTALS OF ELECTRICITY TRAINING SYSTEM



A12

ELECTRICAL INSTRUMENTS SET



A21
A24

ELECTRICAL INSTALLATIONS TRAINING SYSTEM



A26
A29

PROTECTION & POWER TRAINING SYSTEM



A3



A4
A43

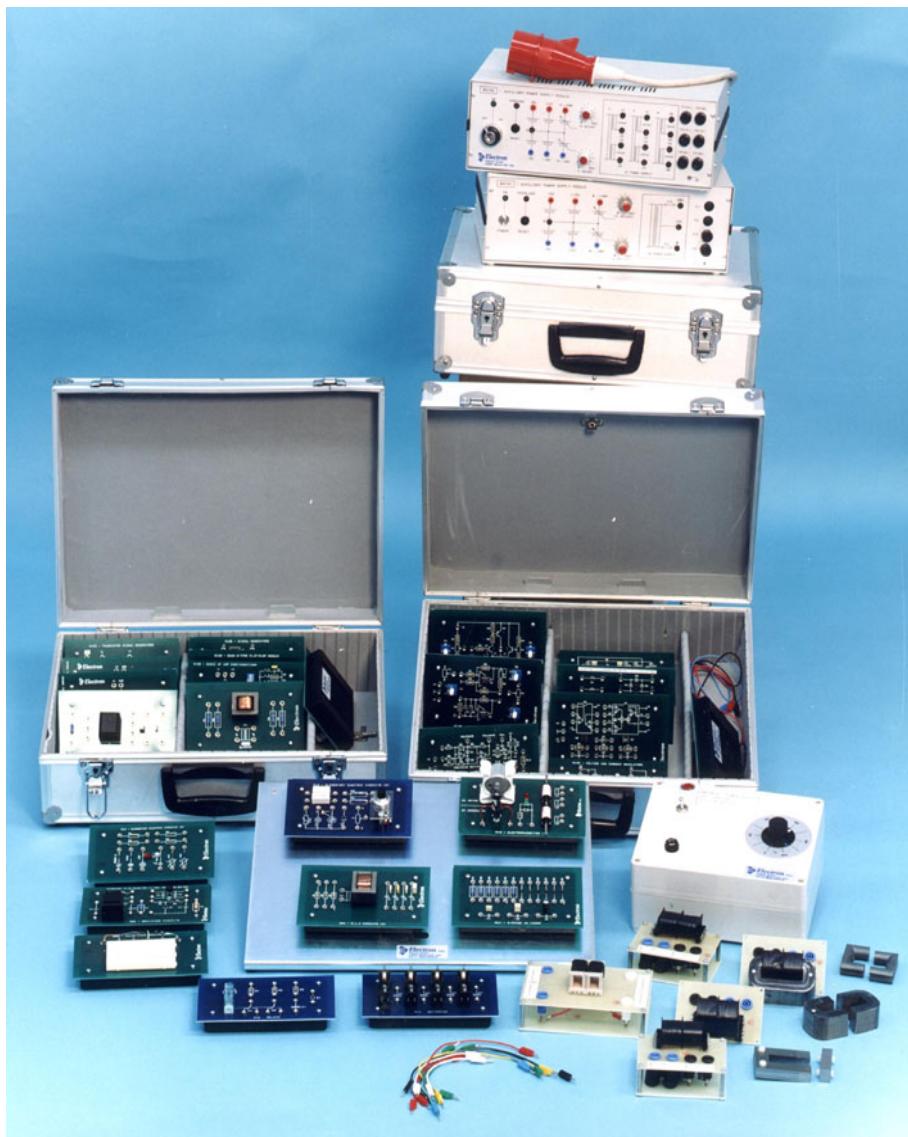
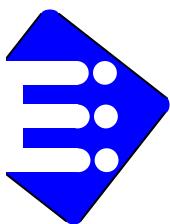
ELECTRICAL MACHINES TRAINING SYSTEM



A51

HOUSEHOLD APPLIANCES TRAINING SYSTEM





MODULAR TRAINING SYSTEM FOR THE STUDY OF FUNDAMENTALS OF ELECTRICITY

A11

The A11 system is suitable for practical study of electricity and electrical measurements, from Electro-physics up to general electronics, in a complete and autonomous system..

Required for the courses in:

Electricity

Automation

Electronics

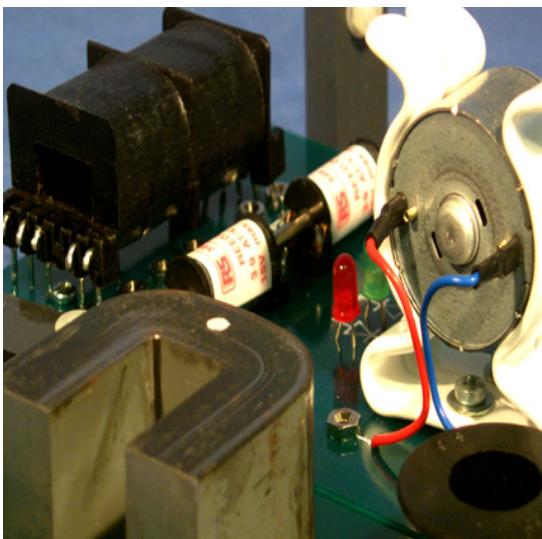
Communications

Mechatronics



MODULAR TRAINING SYSTEM FOR THE STUDY OF FUNDAMENTALS OF ELECTRICITY

A11



The various modules of this training system share the same philosophy and organization: they all consist of box-like modules whose face is made of fibre-glass PCB with components mounted on top and clear silk printing indicating the component identity and inter-connection.

For the execution of the experiments the modules can be placed on a metallic plate (Mother Board), where they are retained by the magnetic base. The connections to the power supply and to the measuring instruments are by plug-in cables.

Certain experiments require more than a single module to be interconnected. This is also done by plug-in cables. The magnetic latching of the modules to the metallic Mother Board ensures that the various items remain steadily fixed even if the Mother Board is placed vertically, as in case of collective demonstrations by the instructor.

The system conforms to international standards for safety and feature internal protection against electrical and thermal overload and mistake from the students.

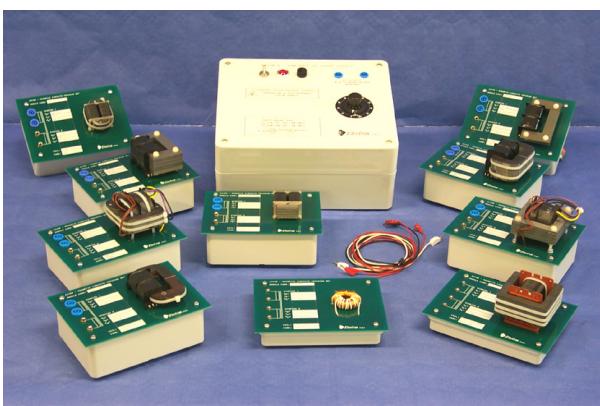
The system is suitable for one working group of 2 to 4 students and for collective demonstration by the instructor.

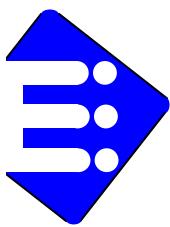
The system is complete with:

- all necessary components and cables
- power supply delivering the fixed and variable AC and DC voltages required to perform the experiments.
- all recommended measuring devices not mentioned as option
- Experiment manuals containing more than 57 experiments
- storage case for the modules &

EXPERIMENTAL TOPICS:

- MAGNETISM
- ELECTROMAGNETISM
- PRACTICAL MAGNETIC CIRCUITS
- PRINCIPLES OF MOTORS AND GENERATORS
- PRINCIPLES OF TRANSFORMERS
- MEASUREMENT OF FLUX
- MEASUREMENT OF RELUCTANCE
- DC CIRCUITS,
- AC CIRCUITS,
- MEASURING TECHNIQUES,
- VOLTAGE SOURCES,
- NON-LINEAR RESISTANCES,
- INDUCTORS AND CAPACITORS





BASIC ELECTROMAGNETIC TRAINER

A1103

The trainer covers the range from Electro-physics to the fundamentals of magnetism up to the principles of transformers, motors and generators.

The study topics include THE MAGNETIC FIELD, ELECTROMAGNETISM, MECHANICAL INTERACTIONS OF MAGNETIC FIELDS AND ELECTRICAL CURRENTS, THE TRANSFORMER

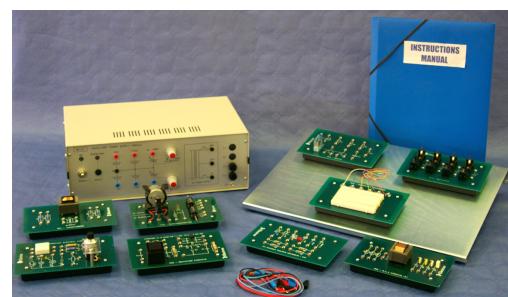
The trainer consist of a collection of modules with a magnetic base and a printed circuit board front face with clear silk printing indicating the component symbols, identity and interconnection. Complete with Power supply, cables, accessories, strong metallic storage case for the equipment modules and instruction manual.



BASIC ELECTRICITY TRAINER BASIC ELECTRICITY TRAINER 3-PHASE

A1105
A1105T

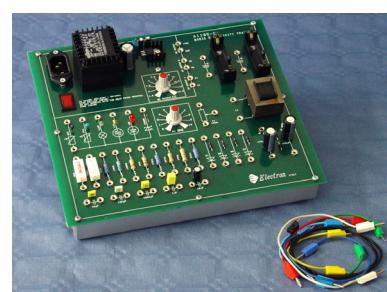
The trainer is a comprehensive collection of training aids, implemented in a modular form, which covers the range from electro physic to DC and AC circuits, up to circuit application of general electronics. Inclusive of power supply.



BASIC ELECTRICITY TRAINER

A1105C

The trainer is a comprehensive training aid, implemented in a modular form, which covers the range from electro-physics to DC and AC circuits, up to circuit application of general electronics. The trainer consists of a collection of circuits on a single, large sized board. The PCB face includes the components and devices needed to perform the experiments with clear silkscreen printing indicating the component symbols and identity.



POWER SUPPLY

A11-B4191

Included in A1105 can also be provided separately.

With all the facilities necessary to perform the experiments during study sessions.

The power supply delivers:

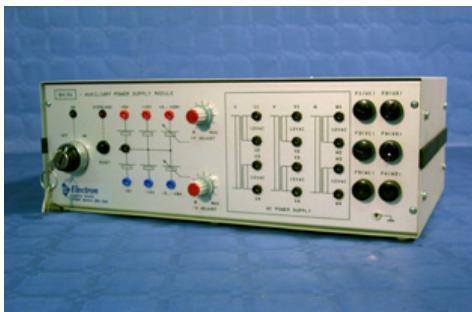
- +/-15V stabilized, short-circuit limited
- +/-5V stabilized, short-circuit limited
- Variable sources 2 to 20 and -2 to 20V, 2A short-circuit limited
- AC source, 15-0-15V, fuse-protected





POWER SUPPLY FOR BASIC ELECTRICITY TRAINER 3 PHASE

A11-B4196



Included in A1105 T can also be provided separately.

- Stabilized +5, -5V outputs
- Stabilized +15, -15V outputs
- Stabilized +2 to +18V output
- Stabilized -2 to -18V output
- 3-phase, AC outputs – 0-12V, 0-12V on each phase (fuse protected 1A)

MAGNETIC CIRCUITS TRAINING SET

A1150



Extension of Basic Electricity trainer, this trainer is a comprehensive collection of training aids, designed in a modular form that cover the fundamentals of magnetism up to the theory of transformers. It includes a power supply, a signal generator and a set of interchangeable components (cores and coils) to set up magnetic circuits of various configurations.

ELECTROCHEMISTRY KIT

A1152



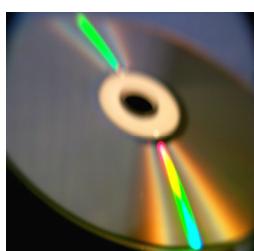
Strong plastic case containing a complete set for the study of electrochemistry.

Complete with:

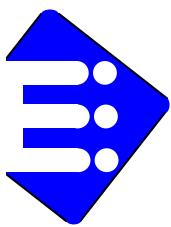
- Hoffman Voltmeter 1 set
- Digital Multimeter 1 pcs
- Analogue Multimeter 1 pcs
- Digital pH Meter 1 pcs
- Power Supply 1 pcs

COMPUTER ASSISTED LEARNING MATERIAL

A11-CAI

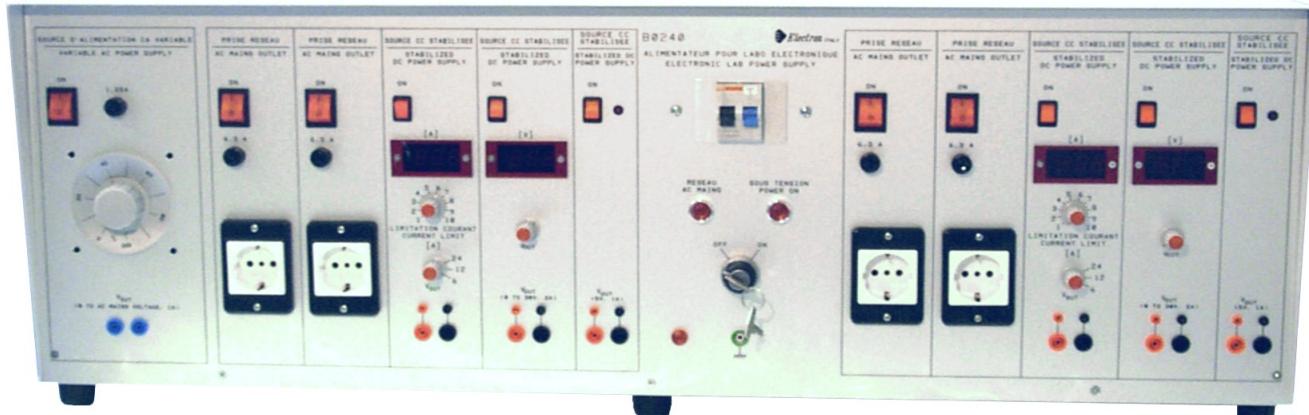


The CAI (Computer Assisted Instruction) System consists of a CD ROM which groups all teaching material, equipment documentation and experiment guide for the related experiment. The objective is to provide the most effective computer-based learning material related to use of training equipment.



Electron

Educational Equipment
Design, Production & Trading



MODULAR TRAINING SET FOR THE STUDY OF ELECTRICAL MEASUREMENTS

A12

Set of instruments and accessories for the Electrical measurement laboratory.

Required for the courses in:

Electricity

Automation

Electronics

Communications

Mechatronics



MODULAR TRAINING SET FOR THE STUDY OF ELECTRICAL MEASUREMENTS

A12



Set of instruments and accessories studied with the objective of providing to the students the instruments necessary to perform the electrical measurements and experiments in the Electrical measurement laboratory.

Great attention is also given to their usability characteristics to ensure maximum friendliness even when used by inexperienced users such as first time students.

Each component is provided with a user manual that explains its characteristics and use.

Included are the classics moving iron meters, bridges, LRC load boxes and rheostats, tapping keys and a handy tool bag, precision power supplies, etc

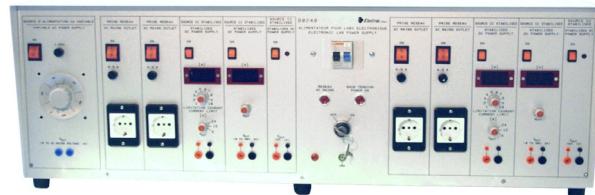




MULTI-PURPOSE POWER SUPPLY

A12-B0240

- 2 stabilized adjustable DC sources 0-30V 2A protected
- 2 stabilized dc sources at selectable fixed voltages 6, 12, 24 V 10A, protected
- 2 stabilized dc sources at 5 V 1A
- 1 adjustable ac source 0-220V 6A



MULTI-PURPOSE POWER SUPPLY

A12-BTP2

- 1 variable AC supply, 0 to 250V AC, 1A
- 1 variable AC supply, 0 to 24V 5A
- 4 AC mains output sockets, SCHUKO standard, 6A each.
- 1 variable stabilized DC source 1.2 to 30V approx.
- 3-digit digital Voltmeter with high visibility displays
- DC output sources at the fixed voltages of +12, -12 V
- 1 stabilized DC source at 5V



ANALOG INSTRUMENTS

- MOVING IRON VOLTMETER Class 0.5
- MOVING IRON AMMETER Class 0.5
- WATTMETER Class 0.5
- COSFI METER 0.2-1-0.8 Class 1
- ANALOGUE AVO METER
DC sensitivity 20.000 ohm/V AC sensitivity 4.000 ohm/V
- GALVANOMETER
scale 30-0-30, 1 Micro A/div internal resistance 400 Ohm, complete with universal shunt.
- MILLIVOLTmeter 60 mV, Class 1



WHEATSTONE BRIDGE, MAXWELL DE SAUTY BRIDGE

WHEATSTONE BRIDGE

For measurement of resistance from 0.1 to 10 M ohm with the accuracy of 0.1%.. It should be completed with electronic galvanometer scale 30-0-30 sensitivity 1 μ A/div. Two pair of terminals for connecting the unknown resistance and the battery.

MAXWELL DE SAUTY BRIDGE

Measuring ranges in four digit reading: from 100 μ H to 111.1 H, with external inductance standard from 0.001 to 1 H. from 10 pF to 111.1 μ F.
Accuracy: 0.1% or better





R L C BOX



INDUCTANCE BOX

3 decades. Decade steps: 10 x (0.01+0.1+1) H. Total inductance: 11.1 H Max current decade: 0.01 H/100 mA - 0.1 H/50 mA - 1 H/25 mA.

CAPACITANCE BOX

Decade steps: 10 x (0.01+0.1+1) μ F Total capacitance: 11.1 μ F

RESISTANCE BOX

Power rating: 0.5 W. Nominal accuracy: $\pm 1\%$ or better at terminals, from d.c. to 1 MHz. Decade steps: 10x(1+10+100+1K+10K)ohm
Decade steps: 10x(1+10+100+1K) ohm

TA TV SHUNTS



CURRENT TRANSFORMER

Class 0.5, primary current up to 50A, secondary current 5A

VOLTAGE TRANSFORMER

Class 0.5, primary voltage up to 1000v, secondary voltage 100V

SHUNT

Class 1, 60 mV, 500A max

LINEAR RHEOSTATS

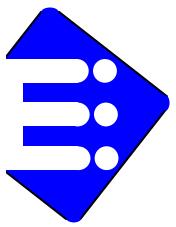


4 types from 100 to 1000 Ohm, 1 to 2 A
Supplied with scale and metal protective cover equipped with rubber feet.

SWITCHES



Switch and Reversing Switch.
For general use in measuring circuits.



Electron

Educational Equipment
Design, Production & Trading



MODULE AND KIT BASED ELECTRICAL INSTALLATIONS TRAINING SYSTEM

A20

Complete and autonomous system suitable for practical study of Residential and Industrial circuits

Required for the courses in:

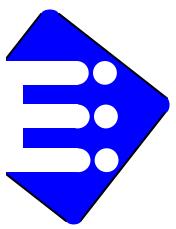
Electricity

Automation

Electronics

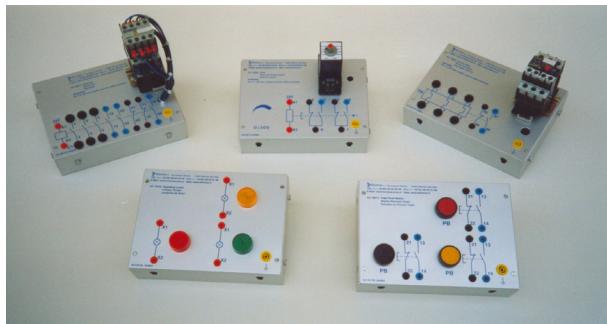
Communications

Mechatronics



MODULE AND KIT BASED ELECTRICAL INSTALLATIONS TRAINING SYSTEM

A20



This system is composed mainly by two sections, according to the teaching level and objectives:

A21 - MODULAR TRAINING SYSTEM FOR THE STUDY OF ELECTRICAL INSTALLATIONS PRINCIPLES

Integrated set of training modules in metal housings with clear synoptic depicting the inside logic, and 4 mm safety terminals. Each module contains a specific electrical function that can be connected to the others to implement different circuit combinations.

The significant advantage for the student is that he can concentrate on the functional flow of the electrical system he is designing without having to worry about the characteristics of the components. Another advantage is that the wiring, and therefore the implementation time, is drastically reduced.

The set can also be used very effectively as a teacher demonstrator.

A24 - MODULAR TRAINING SYSTEM FOR THE STUDY OF ELECTRICAL INSTALLATIONS WIRING

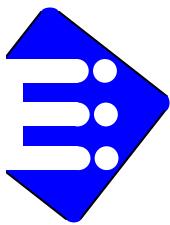
This training system has the objective of teaching the techniques for correct, professional implementation of residential and industrial electrical circuits.

The circuits are assembled on panels by using specialized electrical component kits and electrical wiring kits. The panels can accommodate more students at the same time.

Three types of panels' arrangements are available to satisfy different requirements. A work bench is also available on which the panels can be placed for use.

Main units of this training system:

**RESIDENTIAL INSTALLATIONS MODULES
INDUSTRIAL INSTALLATIONS MODULES
INSTALLATIONS WORK BENCH
RESIDENTIAL COMPONENTS KIT
INDUSTRIAL COMPONENTS KIT**



BASIC INSTALLATIONS TRAINING MODULES

A21-M000

Set of training modules in metal housing with a clear synoptic and with 4 mm. safety terminals to allow the possibility to make different combinations on circuit connections.

Therefore the student can concentrate on the circuit study, by reducing the wiring and mounting time. Longer components life is obtained and all components symbols can be immediately referred with the real components.

The set can be used as a teacher demonstrator.

These modules are common to both residential and industrial installations



RESIDENTIAL INSTALLATION TRAINING MODULES

A21- M100

Set of training modules in metal housing with a clear synoptic and with 4 mm. safety terminals to allow the possibility to make different combinations on circuit connections.

Therefore the student can concentrate on the circuit study, by reducing the wiring and mounting time. Longer components life is obtained and all components symbols can be immediately referred with the real components.

The set can be used as a teacher demonstrator.

The modules included are those typically required to implement a modern residential electrical installation



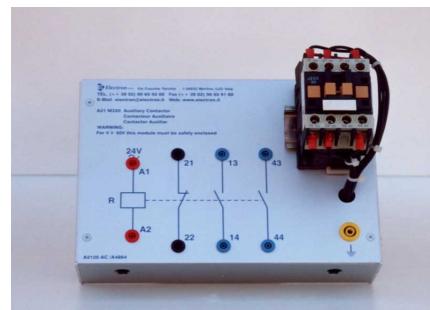
INDUSTRIAL INSTALLATION TRAINING MODULES

A21 M200

Set of training modules in metal housing with a clear synoptic and with 4 mm. safety terminals to allow the possibility to make different combinations on circuit connections.

Therefore the student can concentrate on the circuit study, by reducing the wiring and mounting time. Longer components life is obtained and all components symbols can be immediately referred with the real components. The set can be used as a teacher demonstrator.

The set consists of the modules required to implement single and three-phase control systems



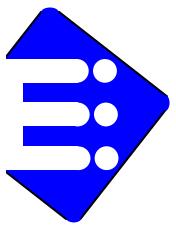
INDUSTRIAL INSTALLATIONS FAULT SIMULATOR

A21-M200 FS

The Fault Simulator consists of a rack on which up to 12 Industrial Installations Modules can be mounted to implement the control circuits described in the Circuits Manual.

The instructor can simulate a large number of faults and ask the students to locate them





AUTO ELECTRICITY TRAINING MODULES

A21-M5



The trainer deals with the wide range of electric and electronic applications in modern motor vehicles.

The aim is to provide a handy means to let the student examine the various electrical vehicle components and to train in the practical setting up, testing and trouble-shooting automotive electric circuit sections.

TEST STATION

A2190



This Test station is designed to be an autonomous test station particularly suitable for testing Residential and Industrial circuits.

It consists of a Bench, and a Universal Power Supply.

ELECTRICAL INSTALLATIONS TRAINING BENCH FOR 2 OR 4 STUDENTS

A2410



This bench is suitable to accommodate up to 4 students for practical exercises on electrical installations.

Simple, strong and durable, according to IEC safety rules, the unit provides all the power supplies needed for testing and operation of all the circuits for the residential and industrial installations.

RESIDENTIAL INSTALLATIONS KIT

A2421



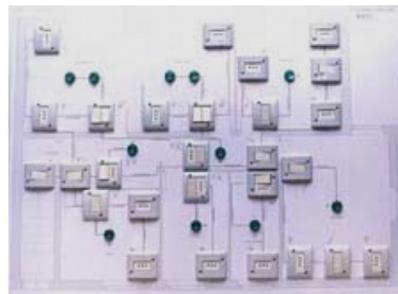
Set of components to study the basic circuits used in residential installations. Suitable to work with the A2410 benches. Every kit is suitable for one group of students.



RESIDENTIAL WIRING TRAINER

A2421D

The Trainer is designed to teach residential electric wiring by showing a typical apartment layout on a wooden exercise board, its electric requirements on a work sheet diagram and by providing a set of components to implement such requirements. The student is requested to understand the apartment layout and the electric diagram, choose the correct components, fasten them in the correct positions of the exercise board, connect them and demonstrate the resulting circuits.



INDUSTRIAL INSTALLATIONS KIT

A2431

Set of components to study the basic circuits used in industrial installations. Suitable to work with the A2410 benches. Every kit is suitable for one group of students.



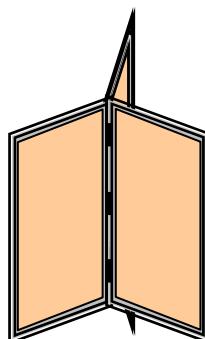
WIRING ASSEMBLY TRAINER

A2450

It can be used as an alternative for implementing Residential as well as Industrial Installations.

SURFACE WIRING KIT for developing skills in clipping, bending and setting surface mounted wires and cables, implementing circuit connection from a fuse board to single and three-phase outlets, circuit breakers, controllers, etc.

CONDUIT WIRING KIT to provide the necessary parts to practice wiring of electrical circuits in isolated conduits.



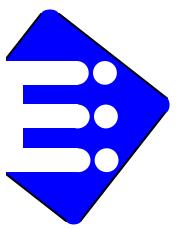
TOOLS KIT PLASTIC AND METAL SHEETS HAND PUNCH KIT

A2470 A2471
A2480

The tools that are normally necessary in an Electrical Laboratory.

Hydraulic gun and accessories for punching round holes in plastic and metal sheets. Can be used to build various kinds of works such as terminal boards and electric panels.





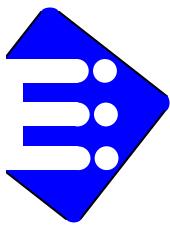
Electron

Educational Equipment
Design, Production & Trading



Electrical Laboratory at Don Bosco Technical School (Sudan)





Electron

Educational Equipment
Design, Production & Trading



MODULAR TRAINING SYSTEM FOR THE STUDY OF PROTECTIONS RELAYS

A26

ELECTRICAL POWER SYSTEM SIMULATOR TRAINER

A29

Simulates a real life generation, transmission and utilization system

Required for the courses in:

Electricity

Automation

Electronics

Communications

Mechatronics

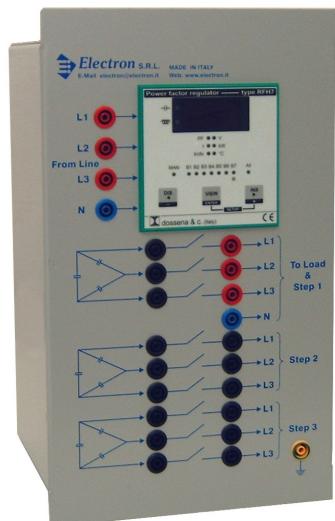


MODULAR TRAINING SYSTEM FOR THE STUDY OF PROTECTIONS RELAYS

A26

ELECTRICAL POWER SYSTEM SIMULATOR TRAINER

A29



MODULAR TRAINING SYSTEM FOR THE STUDY OF PROTECTIONS RELAYS

The system includes single and three-phase, analogue, digital and programmable / PC connectable instruments that are specifically chosen to satisfy the great majority of education requirements.

They are packaged in standard modules with accesses provided through 4 mm safety terminals, clear prints to show as much as possible of the instrument logic and obtain in this fashion the best ergonomic and user oriented industrial design.

The analogue family is available in the single-phase version, the digital family is available in both the single-phase and three-phase versions; the programmable family is available for sophisticated three-phase applications.

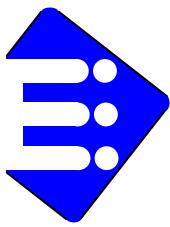
ELECTRICAL POWER SYSTEM SIMULATOR TRAINER

This system simulates a real life generation, transmission and utilization system based on standard electrical machines, instruments and a simulated transmission line. The simulator reproduces the conditions of a 30kV, 30Km long overhead line.

The modularity and integration capabilities of this trainer allow maximum flexibility in implementing the desired configuration with the proposed components that have been chosen in order to make the requested experiments possible.

With the proposed mix of products, additional experiments may be designed to reproduce the many different situations that in a power generation, transmission and utilization system may be encountered both in normal and abnormal/failure conditions. All of them may anticipate what the students are likely to encounter in real life.

The proposed products can also be used in any other laboratory activity and experiment.



ANALOG RELAYS

A265X

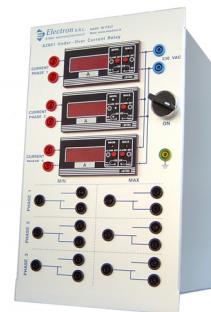
The analog family is available in the single-phase version



DIGITAL RELAYS

A266X

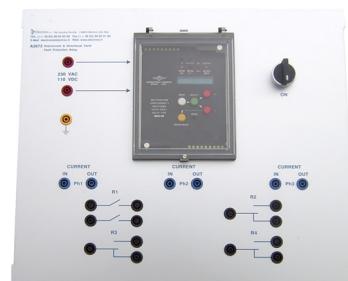
The digital family is available in both the single-phase and three-phase versions



PROGRAMMABLE RELAYS

A267X

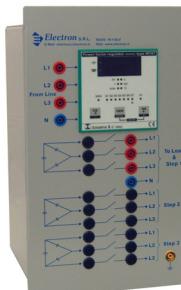
The programmable family is available for sophisticated three-phase applications

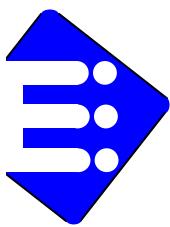


REACTIVE POWER CONTROLLER

A2680

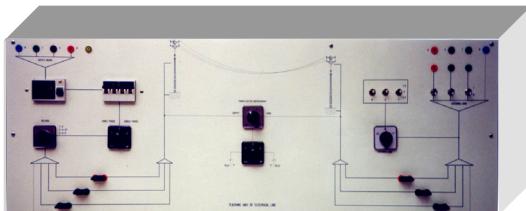
Programmable, microprocessor based, for automatic adjustment of the power factor in systems with inductive load.





ELECTRICAL TRANSMISSION LINE SIMULATOR

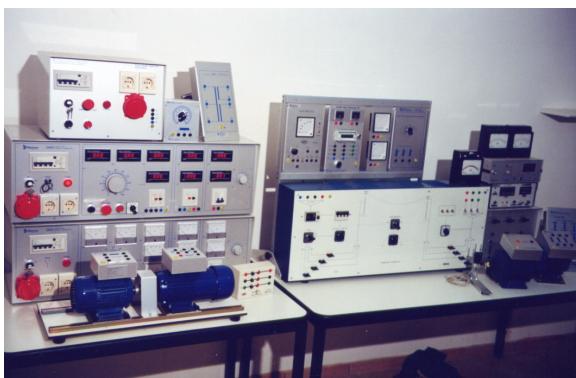
A29 IDLE2



This Trainer simulates a 3 Phase 30 kV, 30Km long overhead transmission line. The operating conditions are simulated by internal resistive-inductive loads that can be connected ON/OFF, full or half value and STAR/DELTA by means of single-phase switches.

BASIC ELECTRICAL POWER SYSTEM TRAINER

A29B

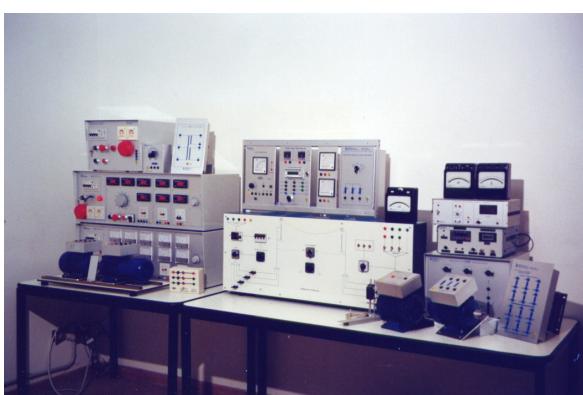


INCLUDING:

- Universal Power Supply
- Shunt Excitation DC Machine
- Series Excitation DC Machine
- Synchronous Machine
- Parallelizing Board
- Line Simulator
- Resistive Load
- Capacitive Load
- Inductive Load
- Squirrel Cage 3 Ph. Motor
- Slip Ring 3 Phase Motor
- Single-phase Motor
- 3-Phase Switch (set of 3 units)
- STAR/DELTA Starter
- Ammeter (set of 6 units)
- Milliammeter
- Voltmeter
- Wattmeter (set of 3 units)
- Frequency meter
- Power Factor Meter
- Digital Three-phase Power Analyzer
- Coupling Base

ELECTRICAL POWER SYSTEM EXPANSION

A29E



INCLUDING:

- Universal Power Supply (Second Unit)
- Shunt Excitation DC Machine (Second Unit)
- Series Excitation DC Machine (Second Unit)
- Synchronous Machine (Second Unit)
- Phase Sequence indicator
- Single Tapping key
- Reversing Switch
- DC Motor Control
- DC Motor Control 4 quadrants
- Single-phase Transformer
- Three-phase Transformer
- Three-phase Variable Autotransformer
- Cables set for Electrical Machines



Electron

Educational Equipment
Design, Production & Trading



MODULAR TRAINING SYSTEM FOR THE STUDY OF MOTORS AND TRANSFORMERS CONSTRUCTION AND REPAIR

A30

For training in assembling, testing and repair of electrical machines.

Required for the courses in:

Electricity

Automation

Electronics

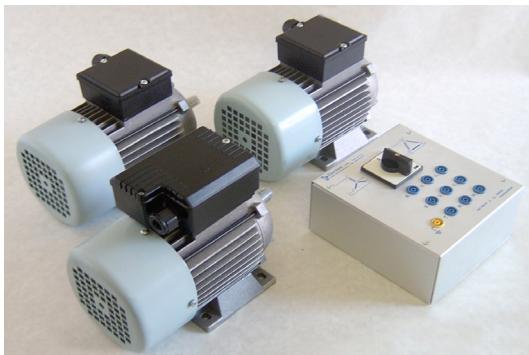
Communications

Mechatronics



MODULAR TRAINING SYSTEM FOR THE STUDY OF MOTORS AND TRANSFORMERS CONSTRUCTION AND REPAIR

A30



This system provides effective training in assembling, testing and repair of electrical machines.

The objective is achieved by providing to the student:

- Effective guidelines based on picture slides with comments about assembling rotating machines and transformers
- A comprehensive manual describing in detail the test procedures with theoretical explanations, principle and wiring diagrams
- The necessary tools to disassemble, repair and reassemble the failing units

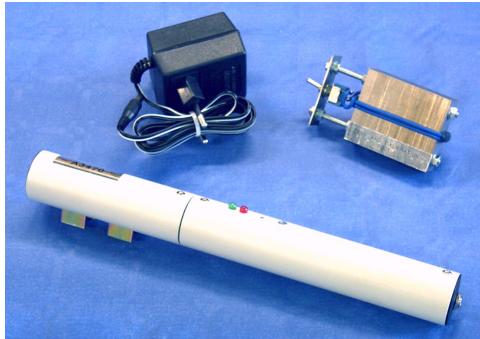
Including the following sections:

MACHINES AND ACCESSORIES SET

Included are winding machines for layer and motor windings, table top manual and motor operated electric high performance machines for more demanding application and accessories for supporting motor stators and rotors, cutting and removing coils and an oven for drying the new ones.

MOTORS AND TRANSFORMERS TESTING SET

It contains a power supply suitable for testing requirements and instruments for checking rotors and stators and their insulation.



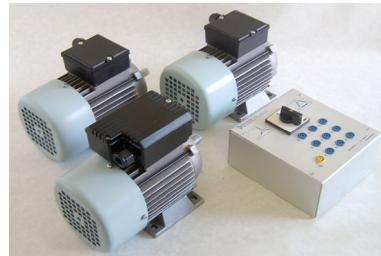


MOTORS ASSEMBLY KIT

A3110

This kit is particularly suited for training in assembly of different type of A. C. motors. The unit comes complete with an educational manual showing all the interconnections and procedures for assembly and test. Composed by the following motors:

- 3 phase squirrel cage 2 poles,
- 3 phase squirrel cage 4 poles,
- 2 speed motor (2/4 poles),
- 1 phase motor



CONSUMABLE FOR MOTOR KIT

A3110CO

Includes all the consumable parts required for the construction of the motor kits A3110. Suitable for rewinding of each motor 10 times.



TRANSFORMERS KIT

A3120

This kit is particularly suited for training in assembly of Single and Three-phase Transformers.

The unit comes complete with an educational manual showing all the interconnections and procedures for assembly and test.

The trainer is composed by the following transformers:

- 1 phase transformer
- 3 phase transformer

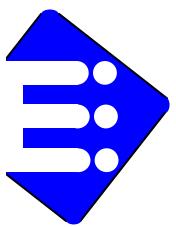


SLIDES FOR MOTOR KITS

A3110SL

Slides to show the steps necessary to build a motor, prior to practical activities the instructor, by pointing out actual construction details and procedures.





CONSUMABLE FOR TRANSFORMER KIT

A3120CO



Includes all the consumable parts required for the construction of the transformer kits

Suitable for rewinding of each transformer 10 times.

SLIDES FOR TRANSFORMER KITS

A3120SL



Slides taken to show the steps necessary to build a transformer, by pointing out actual construction details and procedures.

TOOLS FOR MOTORS & TRANSFORMERS WINDING

A31TS



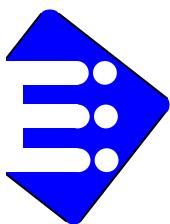
Includes all the tools specifically required when rewinding the proposed motors and transformer kits.

COIL WINDER HAND OPERATED

A3310B



Combined version for winding motor coils and layer windings. The wire that must be guided by hand. Mechanical 5 figures revolution counter with quick reset button. Complete with bobbin holder.



ELECTRICAL COIL WINDER FOR MOTORS

A3320-27

Electrical winding machine for motor coils. The frame is completely of steel. It is provided with single-phase 2HP motor with inverter.

Winding speed continuously adjustable from 0 to 700 rpm.

The three speed gear is suitable for winding wire and strip of medium and large size. The machine is complete with faceplates, arbors, square mandrels, and digital counter.



ELECTRICAL COIL WINDER FOR TRANSFORMERS

A3330-1

Fitted with necessary accessories such as mechanical revolution counter, bobbin holder, electric motor and table with drawer. Wire diameter: 0,06 to 1,4 mm



STATOR SUPPORT

A3340

Suitable for holding electrical motor's stators for making their winding very comfortable.

Easy orientation of the stator so that the operator can always set it in the most convenient position.

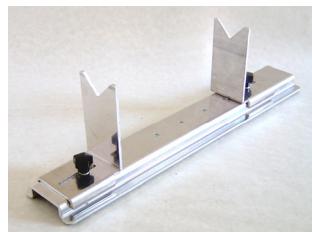


ROTOR SUPPORT

A3343

This support is of rugged construction and ease of handling.

It can accommodate various sizes of rotors.





Electron

Educational Equipment
Design, Production & Trading



CUTTER

A3350



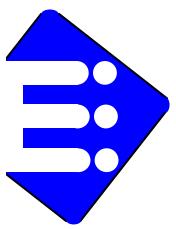
Table top guillotine with adjustable paper clamp, metric scale, sliding square and strip cutting device.

STATOR AND ROTOR TESTER

A3870

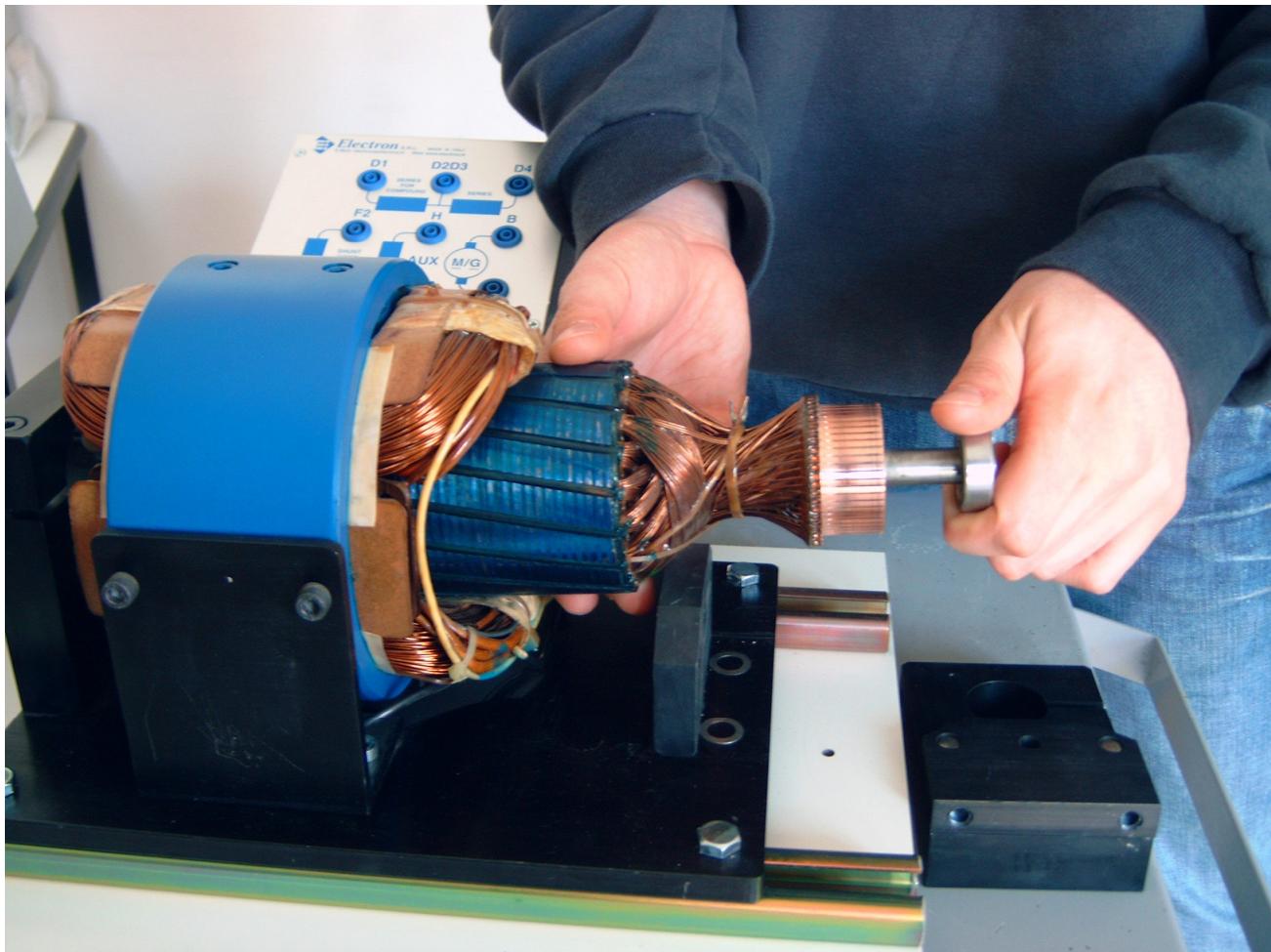


It is a reliable and handy test instrument for quality assurance and fault location in electric motors. Both short-circuits and interruptions of coil windings can be rapidly detected.



Electron

Educational Equipment
Design, Production & Trading



MODULAR TRAINING SYSTEMS FOR THE STUDY OF ELECTRICAL MACHINES

A40

Required for the courses in:

Electricity

Automation

Electronics

Communications

Mechatronics



MODULAR TRAINING SYSTEMS FOR THE STUDY OF ELECTRICAL MACHINES

A40



The system provides a complete range of integrated electrical machines, standard instruments, safety protections and accessories for an effective training on both the AC and DC machines characteristics.

They can be easily and quickly assembled on a test board that ensures safe coupling and noiseless, vibration free running. Educational boards with 4 mm safety terminals and printed electrical diagrams are mounted on each machine.

The power of the electrical machines is ranging from 3 KW (**System A4L**), 1KW (**A4M**) and fraction of HP (**A4S**)

The accessories are modular and are implemented in rugged enclosures that can be optionally mounted on an aluminum frame when being exercised or when stored.

They can be used both for individual and for group demonstration purposes.





UNIVERSAL POWER SUPPLY

A4-A0240

The power unit is suitable to provide all the voltages required to perform the experiments in the electrical machines laboratory. In rugged metal housing, with clear synoptic, with 4 mm safety terminals and protections on all outputs without fuses. Inclusive of differential protection.



SINGLE-PHASE TRANSFORMER

A4110

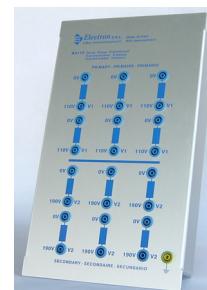
Typical industrial transformer specially equipped to be suitable for training. For this purpose it is provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic which allows different combinations of winding connections.



THREE-PHASE TRANSFORMER

A4115

Typical industrial transformer specially equipped to be suitable for training. For this purpose it is provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic which allows different combinations of winding connections.



MAGNETIC CIRCUITS TRAINING SET

A4150

Includes a set of interchangeable cores and coils to set up magnetic circuits of various configurations (E, I, C, U, O).



SQUIRREL CAGE MOTOR

A4220

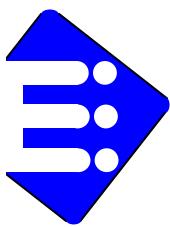
Typical industrial motor specially equipped to be suitable for training.

Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.



FAULT SIMULATOR FOR SQUIRREL CAGE MOTOR

Typical faults can be simulated.



SLIP RING MOTOR

A4222



Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections.

A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.

SYNCHRONOUS MACHINE

A4223



Equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections.

A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.

TWO SPEED MOTOR

A4224



Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.

RELUCTANCE MOTOR

A4228



Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base

SINGLE-PHASE MOTORS

A4230 A4232



Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.

SPLIT PHASE MOTOR (CAPACITOR RUN) MODEL A4230
Two poles,
CAPACITOR START MOTOR MODEL A4232 Two poles,



UNIVERSAL MOTOR

A4234

Approximate speed 3000 RPM Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.



REPULSION MOTOR

A4236

Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.



SHADED POLES MOTOR

A4238

Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.



DC COMPOUND EXCITATION MOTOR-GENERATOR

A4240

Approximate speed 3000 RPM Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.

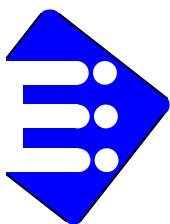


DC SERIES EXCITATION MOTOR-GENERATOR

A4242

Approximate speed 3000 RPM Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.





DC SHUNT EXCITATION MOTOR-GENERATOR

A4244



Approximate speed 3000 RPM Typical industrial motor specially equipped to be suitable for training. Provided with an Educational Terminal Board with 4 mm terminals and a clear synoptic showing the winding connections. A comprehensive set of accessories and a joint allow easy and quick coupling with other machines or with the brake on the coupling base.

DC POLYEXCITATION MOTOR-GENERATOR

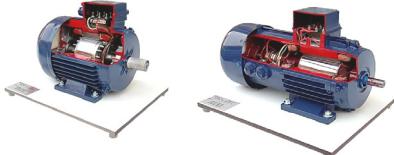
A4246



Educational machine specially equipped to be suitable for training. For this purpose the windings ends are connected to 4 mm safety sockets in a metal housing on top of which a clear electrical drawing shows the internal logic. The students can therefore easily understand operation and windings connections. The machine has one shunt and two series excitation windings.

SET OF CUT-AWAY ELECTRICAL MACHINES

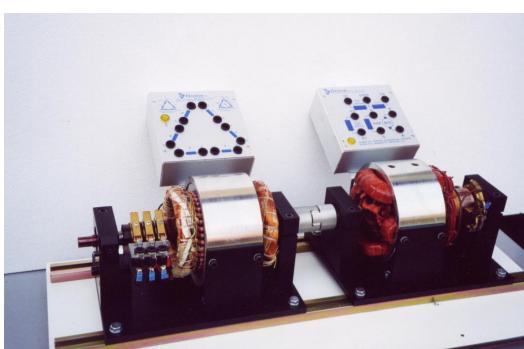
A42C



The set includes the following electrical machines approx 300w size:
 Squirrel cage motor
 Slip ring motor
 Synchronous machine
 DC machine

MULTI USE ELECTRICAL MACHINE TRAINER

A4300



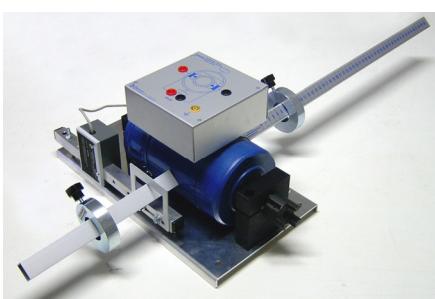
A compact and integrated system to perform most experiments and tests on standard electrical machines. More than 12 different rotating machines can be assembled and exercised with its components. Compared to a set of discrete machines the advantages are lower cost, modularity and, owing to the complete visibility of the components, the possibility for the student to learn their electrical and construction details.

The windings are connected to terminal boards on top of which they are clearly identified by drawings that show the internal logic and make their understanding and connections easy in the different possible combinations.

The synchronous machine is in all respect a real implementation and not a simulated function of the asynchronous unit

BRAKES

A44

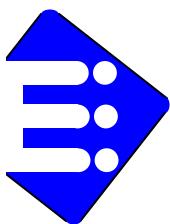


Specially designed for braking and measuring torque of all rotating machines in a school laboratory environment. Equipped with an Educational Terminal Board with 4mm terminals and a clear synoptic showing the feasible connections. The torque may be displayed by the Torque Meter fitted with Load Cell. Arm Weights and Counterweights are supplied for traditional measuring.

MODEL A4410 POWDER BRAKE

MODEL A4420 EDDY CURRENTS BRAKE

MODEL A4430 BRAKE GENERATOR



LOADS

A45

Designed to be used with generators in a training environment. For this purpose the unit is enclosed in metal housings and provided with Educational Terminal Boards with 4mm terminals and clear synoptic showing the feasible connections. Can be connected in Series, Parallel, Star and Delta configurations. Can be connected to AC Single and 3 Phase and DC sources. Controlled by 3 rotary switches with an "Off" plus 7 positions for incrementing the load power of approximately 5% at each step.

MODEL A4510 RESISTIVE LOAD

MODEL A4520 CAPACITIVE LOAD

MODEL A4530 INDUCTIVE LOAD



RHEOSTATS

A46

MODEL A4610 STARTING RHEOSTAT FOR DC MOTORS

Suitable for DC motors, with 1/2 torque control
In a metal housing complete with 4 mm terminals.

MODEL A4620 STARTING RHEOSTAT FOR 3PH MOTORS

Suitable for 3-phase motors, with 1/2 torque control
In a metal housing complete with 4 mm terminals

MODEL A4630 EXCITATION RHEOSTAT FOR DC MACHINES

In a metal housing complete with 4 mm terminals.
Suitable for the machines of the laboratory.



TACHOMETER

A4720

Bench type equipment in metal housing, suitable for training. The unit is autonomous and fully compatible with the other laboratory modules. Measuring range: 0 to 4,000 RPM. To be used with the speed transducer element.

OPTICAL TRANSDUCER FOR TACHOMETER Complete with accessories for mounting near the laboratory machines



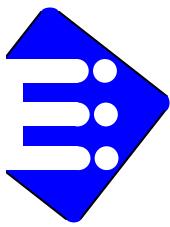
TORQUE METER

A4730

Suitable to measure the motor output torque through load cell arranged on brake unit.

TRANSDUCER FOR TORQUE METER Complete with accessories for mounting near the laboratory machines.





ANALOGUE ELECTRIC MEASURING MODULES

A4750A



This set provides all DC and AC measures required for the Electricity laboratory and for any electrical machines bench composition.

All meters are of analogue type, with portable permanent magnet moving coil instrument suitable for d.c. current or voltage measurements. Moreover by means of self-contained rectifier a.c. measurements are possible.

DIGITAL ELECTRIC POWER MEASURING MODULE

A4750D



The unit contains three instruments that make it suitable for most laboratory and education requirements. The instruments are: DC Ammeter for up to 10A DC Voltmeter for up to 500V Three-phase Power Analyzer for measuring several electrical parameters like Voltage phase to phase and phase to neutral, Currents on L1-L2-L3, Power Factor, Active Power on L1-L2-L3, Frequency, KWh KVARh

PARALLELING BOARD

A4810



To connect in parallel, or with the mains, the synchronous generators of the laboratory.

MOTOR SWITCHES

A4820 A4830 A4831



A4820 Star delta switch (A21M216) Educational type.

A4830 Pole reversing Switch (A21M215) Educational type.

A4831 Speed Reversing Switch (A21M214) Educational type



COUPLING BASE

A4840

To be used for coupling any two machines or a machine with the brake. The unit consists of rails and all accessories for machines mounting and fixing the machines. It is inclusive of a proper Coupling Guard (to protect the rotating coupled motor's shafts). Available accessories are the Rotor locker (to be used for starting torque measurement) and the trolley, for free movement of the machine group within the laboratory benches.



CABLES SET

A4890

Composed by a set of cables in the quantity (60), length and colour suitable to perform even the more complex experiment.



PANEL SUPPORT

A4- B4195

The frame is designed to house 6 modules of the basic 340 x 260 mm size or an equivalent mix of single, double and triple-size modules. The frame houses the equipment in an orderly and convenient manner, suitable for use and demonstration.



PC BASED DATA ACQUISITION SYSTEM

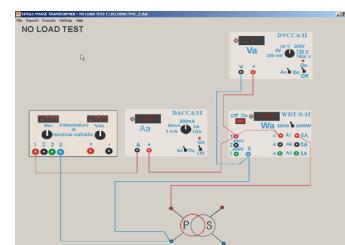
A4782

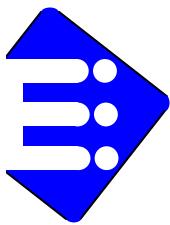
The Data Acquisition System consists of a Data Acquisition Unit and a Windows based data acquisition and processing Software.

The Data Acquisition Unit interfaces a PC through an RS232 port and the electrical machines under test by means of 4 mm test cables.

The following Software Modules are supplied with the Data Acquisition Unit:

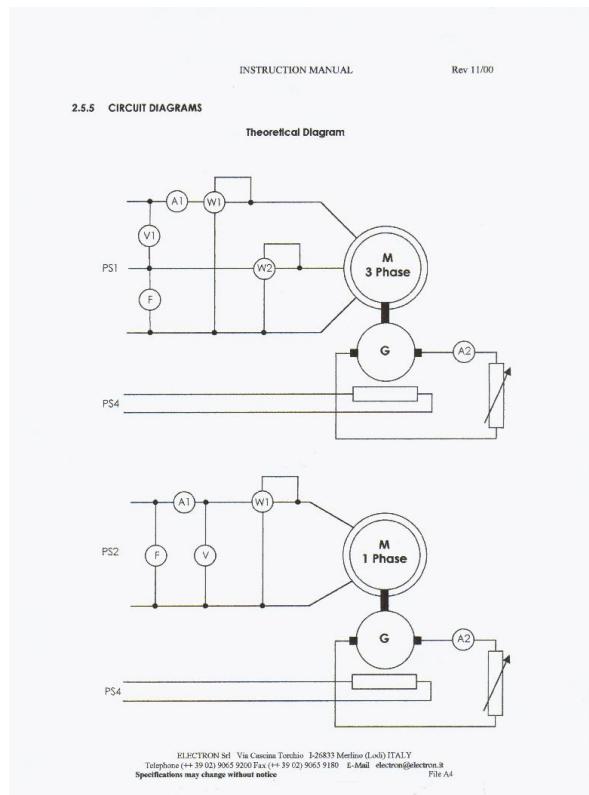
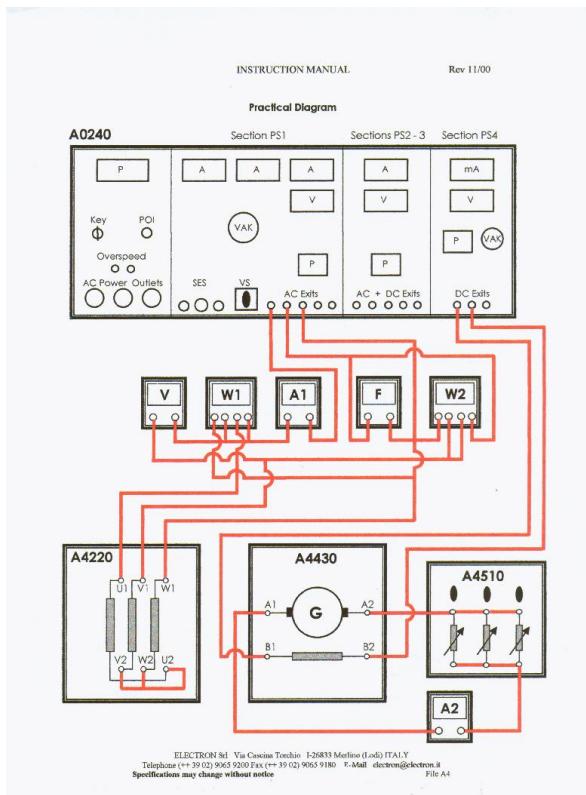
- Single-phase Transformers
- Three-phase Transformers
- Single and Three-phase Asynchronous Motors
- Synchronous Machines (on request only)
- DC Machines





EXAMPLE OF DESCRIPTION OF AN EXPERIMENT ON AN ELECTRICAL MACHINE

(Actual copy from the Student Experiment Manual)



INSTRUCTION MANUAL Rev 11/00

2.5.7 WORKSHEETS

Three Phase

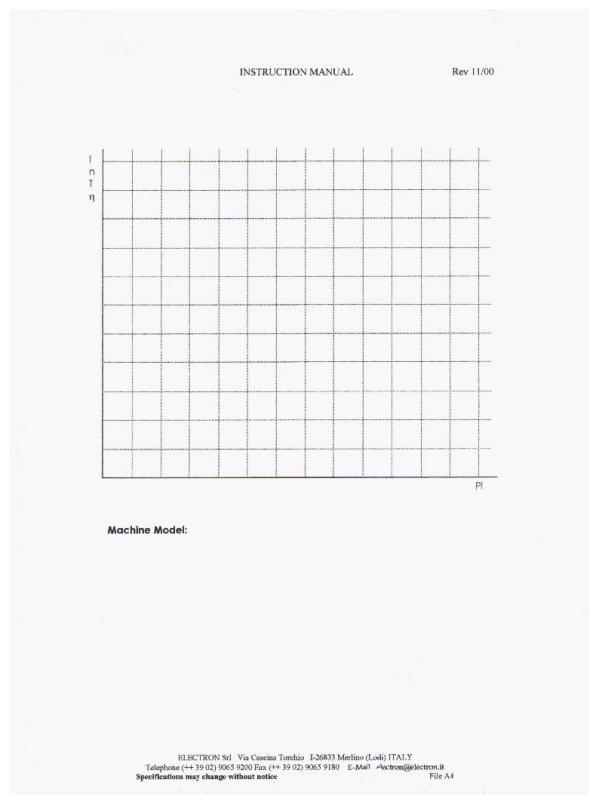
Parameter	Symbol	Unit	Value					
Load / Nominal Load		%	125	100	75	50	25	
Armature Voltage	P53	V						
Armature Current	A2	A						
Arm Length	a	m						
Torque	T	Nm						
Speed	n	rpm						
Excitation Current	P54	A						
Input Power	Pa	W						
Output Power	P _r	W						
Power 1	W1	W						
Power 2	W2	W						
Efficiency	η							

Single Phase

Parameter	Symbol	Unit	Value					
Load / Nominal Load		%	125	100	75	50	25	
Armature Voltage	P53	V						
Armature Current	A2	A						
Arm Length	a	m						
Torque	T	Nm						
Speed	n	rpm						
Excitation Current	P54	A						
Input Power	W1	W						
Output Power	P _r	W						
Efficiency	η							

Machine Model:

Electron Srl Via Cascina Tordio 1-26833 Merlino (Lodi) ITALY
Telephone (+39 02) 9065 9200 Fax (+39 02) 9065 9180 E-Mail electron@electron.it
Specifications may change without notice File A4





Electron

Educational Equipment
Design, Production & Trading



MODULAR TRAINING SYSTEM FOR THE STUDY OF HOUSEHOLD APPLIANCES MAINTENANCE

A51

This product line includes trainers to be used in basic electricity courses as well as in vocational courses for maintenance and repair technicians.

Required for the courses in:

Electricity

Mechatronics

Electronics

Communications

Automation



MODULAR TRAINING SYSTEM FOR THE STUDY OF HOUSEHOLD APPLIANCES MAINTENANCE

A51



This product line includes trainers to be used in basic electricity courses as well as in vocational courses for maintenance and repair technicians.

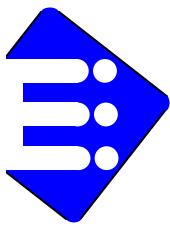
It consists of commercial apparatus of latest design (included are: pressing iron, desk fan, refrigerator and washing machine) modified for teaching purposes.

The scopes of this didactic transformation are:

- To make the essential parts of the apparatus visible so that the principles of operation can be understood
- To show the implementation and construction aspects of the apparatus so that the student becomes acquainted with the practical aspects and characteristics of the components.
- To train in troubleshooting (whenever applicable).

Typical experiments of the system:

- System description (block diagram)
- Test point description
- Description of simulated faults
- Original instruction manual



HOUSEHOLD CLOTHES IRON DEMONSTRATOR

A5130

This trainer consists of a Clothes Iron of a renowned make and reliability, transformed for didactic use.

The unit is intended for use in both vocational and advanced technical study courses.

The Iron is mounted on the front face of a sturdy metallic housing, partially disassembled so that each construction aspect is observable.



DESK FAN DEMONSTRATOR

A5140

This trainer consists of a Table Fan of a renowned make and reliability, transformed for didactic use.

The unit is intended for use in both vocational and advanced technical study courses.

The Fan has the original motor case modified by the insertion of a transparent protective cover, allowing a more detailed study of the mechanical parts of the apparatus.





DOMESTIC REFRIGERATOR TRAINER

A5180 AR



The trainer consists of a commercial apparatus of renowned quality and reliability transformed for didactic use. The unit is intended for use in both vocational and advanced technical study courses.

The transformation consists in the addition of a clear synoptic board with the system block diagram and a fault simulator.

WASHING MACHINE TRAINER

A5180 AW



The trainer consists of a commercial apparatus of renowned quality and reliability transformed for didactic use. The unit is intended for use in both vocational and advanced technical study courses.

The transformation consists in the addition of a clear synoptic board with the system block diagram and a fault simulator.